

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CYTONOME/ST, LLC,)	
)	
Plaintiff,)	
)	
v.)	C.A. No. 19-301 (RGA)
)	
NANOCELLECT BIOMEDICAL, INC.,)	
)	
Defendant.)	

DECLARATION OF DR. GIACOMO VACCA

I, Giacomo Vacca, Ph.D., declare the following:

1. My name is Dr. Giacomo Vacca. I have been engaged by Cytonome/ST, LLC (“Cytonome”) as an independent expert consultant in this proceeding before the United States District Court for the District of Delaware. I have been asked by Cytonome’s attorneys to provide this declaration regarding Defendant NanoCollect Biomedical, Inc.’s (“NanoCollect”) Responsive Claim Construction Brief dated January 10, 2020. I have been asked to focus specifically on NanoCollect’s assertions of what a person of ordinary skill in the art would understand with respect to the meaning of the terms “reservoir,” “buffer,” “chamber,” “absorbing,” and/or “dampen” in certain asserted claims of U.S. Patent Nos. 6,877,528 (the “’528 Patent”); 8,623,295 (the “’295 Patent”); 9,011,797 (the “’797 Patent”); 9,339,850 (the “’850 Patent”); 10,029,263 (the “’263 Patent”); and 10,029,283 (the “’283 Patent”). My opinions and the bases for my opinions are set forth below.

I. Qualifications

2. Attached as Exhibit 1 is my curriculum vitae, incorporated by reference within this declaration. The following is a brief summary of my qualifications.

3. I received a Bachelor of Arts (B.A.) degree and a Master of Arts (M.A.) degree, both from Harvard University, in 1991, and a Doctorate (Ph.D.) in Applied Physics from Stanford University in 2001. As part of my doctoral dissertation work, I invented a technique to use light scattering to probe fluid phenomena on very short timescales, and designed and built a laboratory and all necessary custom equipment to demonstrate it. While pursuing my doctoral studies, I also worked as a Graduate Teaching Assistant, leading laboratory and discussion sessions and grading student assignments for physics courses.

4. From 1991 to 1994, I was Associate Physicist at Exxon Research & Engineering Company in Clinton, New Jersey. This facility was at the time the corporate research headquarters of Exxon Corporation. There I conducted X-ray scattering experiments to analyze and characterize complex fluids, thin films, and composite materials, and designed and built equipment to study the flow of multiphase fluids in porous media.

5. From 2000 to 2002, I was Design Physicist at Lightwave Microsystems Corp. in San Jose, California. I was a co-inventor of several issued patents at the intersection of optics and microfluidics, for applications from telecommunication to biotechnology. I set up a new laboratory for research and development of microfluidics-based optical devices, and prototyped early device concepts. I also designed optical integrated circuits (the equivalent of electronic integrated circuits, using light instead of electricity), modeled device behavior and analyzed fabrication data sets to improve yield and performance.

6. From 2002 to 2005, I took on the successive roles of Optical Engineer, Project Leader, and Product Marketing Manager at Picarro, Inc., in Sunnyvale, California, a company which at the time was developing and manufacturing solid-state lasers and laser-based instrumentation for applications in flow cytometry, microscopy, and spectroscopy. I was involved

in the development, transfer to manufacturing, and, later, marketing, of the Cyan laser product line—a compact and robust solid-state 488-nm laser light source aimed at the flow cytometry market. I also led the development of a tunable solid-state infrared laser for spectroscopy applications.

7. From 2005 to 2011, I was Program Development Manager in the New Product Introduction Department of the Hematology Business Unit, Diagnostics Division, of Abbott Laboratories in Santa Clara, California. I later took on additional, concurrent roles of Intellectual Property Manager in the same business unit; and I was a Member of the New Technology Group in the Diagnostics Division. I was responsible for generating, proving, developing, and ultimately launching new technology concepts in flow-cytometry-based semi-automated hematology analysis, encompassing all core aspects of reagent design, fluidic control, optical interrogation, signal processing, and cell identification algorithms. In 2010, in recognition of my research and innovation efforts, I was inducted as a Research Fellow into Abbott Laboratories' Volwiler Scientific Society—a scientific honor bestowed on less than 0.04% of the company's then worldwide employee base of more than 80,000. I also received several company awards for both research and research management.

8. Since 2011, I have been leading and growing the company I founded, Kinetic River Corp., a biophotonics design, consulting, and product development firm focused on flow cytometry and based in California's Silicon Valley. Through my company, I have been consulting for firms ranging from one-person startups to Fortune 500 multinationals; our client engagements cover a wide range of project types, from design and prototyping to intellectual property analysis, competitive landscaping, and technical due diligence in Mergers & Acquisitions (M&A). The focus of my company's efforts is the intersection of light and biology: flow cytometry is the core

competency, and most of our projects involve cell analysis. Since 2015, my consulting activities at Kinetic River have included a growing effort spent on expert witness cases.

9. In 2013, I co-founded BeamWise, Inc., a company developing software tools for the automation of optical system design, based in San Jose, California. I am Chief Scientific Officer at BeamWise, a role I carry out concurrently to my role as President of Kinetic River Corp.

10. I have published a number of papers in various areas of optics; most recently I have written flow-cytometry-related research and technical articles in peer-reviewed papers, conference proceedings, and professional publications. I am the inventor or co-inventor on 36 issued United States patents, 15 issued international patents, and 18 pending United States and international patent applications. I am the recipient of four competitive SBIR research incentive government grants from the National Institutes of Health. I have presented my original work regularly at flow cytometry and optics conferences and workshops, and I have been invited to chair sessions, deliver talks, lead workshops, and participate in panel discussions on topics from flow cytometry instrumentation to microfluidics to optical system design. A full list of my publications, patents and patent applications, conference presentations and invited talks is included in Exhibit A.

II. Background

A. Materials Considered

11. I considered the following materials for this declaration, as well as any other materials cited herein:

- The Asserted Patents
- NanoCollect's Responsive Brief of January 10, 2020
- U.S. Patent No. 5,777,649
- U.S. Patent No. 6,592,821
- U.S. Patent No. 6,561,224
- U.S. Patent No. 5,976,336
- U.S. Patent No. 4,936,465

B. Compensation

12. I am being compensated at my standard consulting rate of \$600 per hour for the time I spend on this matter, I have no personal financial interest in any of the entities involved in this proceeding, and my compensation does not depend in any way on my testimony, my conclusions, or the outcome of my analysis.

C. Prior Testimony

13. I have provided expert testimony in the following matters:

- PGR2015-00017
- IPR2016-00756
- IPR2015-01870
- IPR2016-01418
- IPR2016-00927
- IPR2018-00248
- *Inguran, LLC v. ABS Global, Inc.*, No. 17-cv-446-WMC (W.D. Wis.)

III. Person of Ordinary Skill in the Art

14. I understand that my opinions should be from the perspective of a “person of ordinary skill in the art” at the time of the inventions. Accordingly, although I have not yet reviewed all of the relevant materials needed to fully assess and confirm the level of skill in the art, I have formed a preliminary opinion on the level of ordinary skill in the art, as described below, for the purposes of preparing this declaration.

15. I understand that the factors to be considered in determining the level of ordinary skill in the art are: (1) the educational level of active workers in the field, including the named inventors of the patent; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; and (5) the sophistication of the technology in the art.

16. I understand that the ’528, ’295, ’797, ’850, ’263, and ’283 Patents (the “Asserted Patents”) claim priority to an application filed on April 17, 2002. Lacking any other information

at this time on the precise dates of the respective inventions claimed, I will use April 2002 as the operative date for determining the level of skill and knowledge of a person of ordinary skill in the art of these patents.

17. Based on my review of the three patents listed above, and my consideration of the abovementioned factors, it is my preliminary opinion that a person of ordinary skill in the art in April 2002 would be someone with a graduate degree in bioengineering or mechanical engineering, concentrating on fluid dynamics and having some hands-on experience with microfluidics; or with a bachelor's or master's degree in a related field and at least three years of experience in designing or developing microfluidic systems.

IV. Legal Standard for Indefiniteness

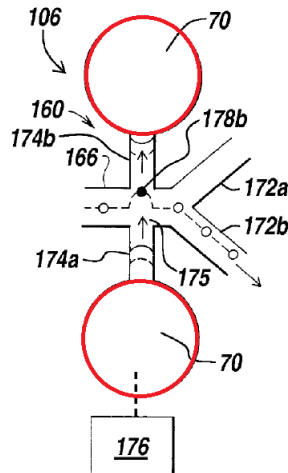
18. I understand that NanoCollect contends that some of the asserted claims are indefinite based on the indefiniteness of certain claim terms. I understand that a claim is not indefinite unless the claim, when read in light of the intrinsic record, fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention. I have applied that standard where appropriate in this declaration.

V. “Reservoir”

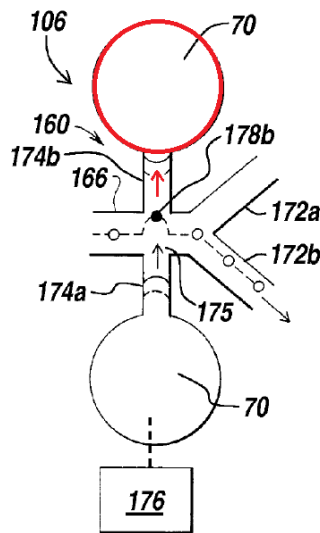
A. “Reservoir” in the '295 Patent (claim 1)

19. I understand from counsel for Cytonome that NanoCollect contends that claim 1 of the '295 Patent is indefinite because the patent “fails to disclose a sufficiently definite structure” for the term “reservoir.” I disagree for the reasons below.

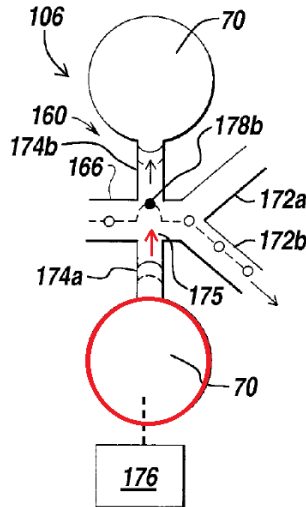
20. The term “reservoir” is used throughout the '295 Patent and refers to a specific structure. Figure 17A provides two examples of the claimed reservoirs (component 70, annotated in red):



21. The “reservoir” phrases in claim 1 of the ’295 Patent closely track this figure. Claim 1 recites “a first reservoir operatively associated with the flow channel and adapted for dampening or absorbing a pressure pulse propagated across the flow channel.” That is the top reservoir shown in Figure 17A, with the arrow indicating that the “first reservoir” receives the pressure pulse:



22. Claim 1 further recites “a second reservoir operatively associated with the flow channel and adapted for generating the pressure pulse based on a change in volume or pressure in the second reservoir.” That is the bottom reservoir in Figure 17A, with the arrow indicating that the “second reservoir” *generates* the pressure pulse:



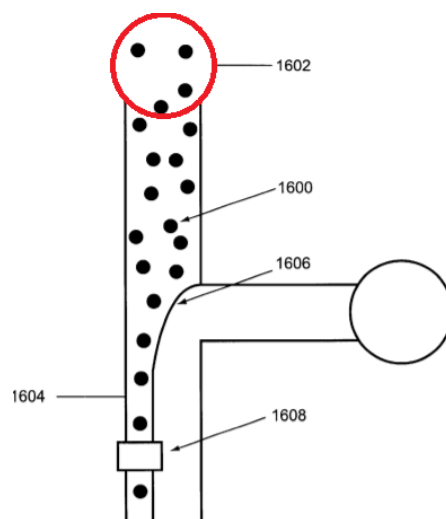
23. The '295 Patent's description of Figures 16–17C confirms this understanding. The patent describes two “bubble valves” that work in tandem to sort particles using the two reservoirs depicted in the figures. According to the specification, a detector “senses a predetermined characteristic in a particle,” which activates “actuator 176” (shown in Figure 17A above), which in turn “cause[s] pressure variations in the reservoir 70 of the first bubble valve.” *See* '528 Patent at 12:9–15, 23–37. This pressure variation deflects the selected particle having the predetermined characteristic—i.e., the “black” circle in Figure 17A above—into a different outlet from the other particles. *Id.* This corresponds to the “second reservoir operatively associated with the flow channel and adapted for generating the pressure pulse based on a change in volume or pressure in the second reservoir” in claim 1.

24. The specification further describes that the “second side passage 174b and the second bubble valve [106] absorb the transient pressure variations in the measurement duct 166 induced via the actuator 176” due to the resilient properties of “reservoir 70b.” *Id.* at 12:15–22. This corresponds to the “a first reservoir operatively associated with the flow channel and adapted for dampening or absorbing a pressure pulse propagated across the flow channel” in claim 1.

25. Accordingly, the specification would reasonably inform a person of skill at the time of the invention that the term “reservoir” in claim 1 of the ’295 Patent refers to a definite structure, namely a physical structure that contains fluid.

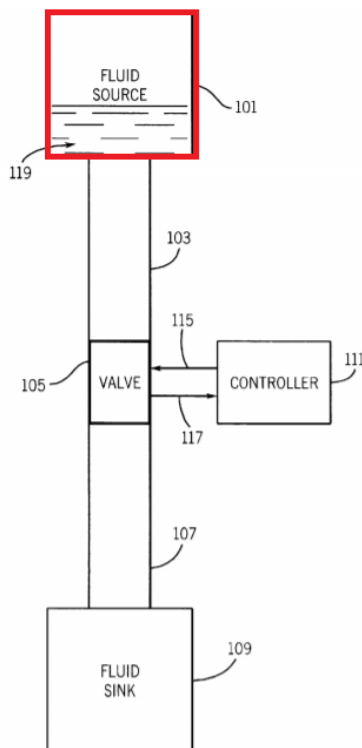
26. Furthermore, the term “reservoir” had a commonly understood meaning in the field of microfluidics in 2002 and was consistent with the reservoir structures described in the ’295 Patent. As explained in the Background of the Invention of the ’295 Patent, microfluidic systems or devices were understood at the time of the invention as “a network of processing nodes, *chambers and reservoirs* connected by channels, in which the channels have typical cross-sectional dimensions in the range between about 1.0 μm and about 500 μm .” *Id.* at 1:52–56 (emphasis added). The patentees therefore acknowledged that persons of skill would have already had an understanding of the term “reservoir,” or else they would not have understood how to include them in microfluidic systems or devices. I agree with this, and several references cited during prosecution of the Asserted Patents support this conclusion.

27. For example, Figure 16 of U.S. Patent No. 6,592,821 to Wada (“Wada”)—cited on the face of the ’295 Patent—depicts a “well” 1602:



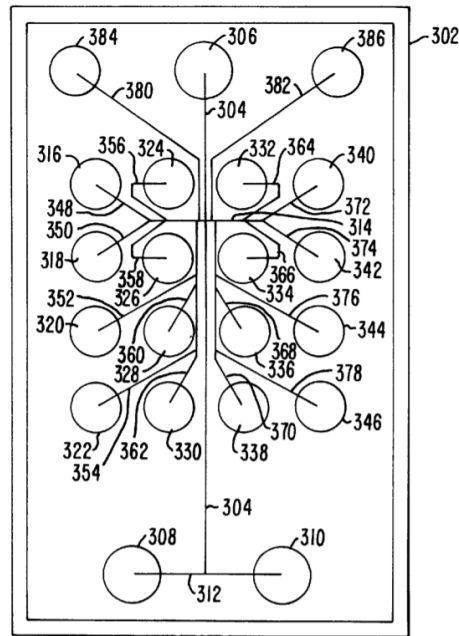
Wada at Fig. 16, 13:1–9. This is a typical example of a fluid reservoir formed as (often) a shallow cylindrical well in one or more layers of a substrate. Reservoirs are typically formed in this way in microfluidic devices due to ease of fabrication, but the exact geometry may vary.

28. U.S. Patent No. 6,561,224 to Cho (“Cho”)—which is cited on the face of the ’295 Patent—depicts another example of a reservoir as “fluid source” 101 in Figure 1:



Cho explicitly refers to this “fluid source” as a “reservoir[]” that can be employed in the micro-electro-mechanical systems (“MEMS”) disclosed in the Cho patent. Cho at 3:64-67. Such a structure would have been well-understood by persons of skill as another typical example of a “reservoir” at the time of the invention.

29. U.S. Patent No. 5,976,336 to Dubrow (“Dubrow”) provides additional examples. Dubrow is generally directed to “microfluidic devices which incorporate improved channel and reservoir geometries” and discloses several reservoirs formed in a substrate:



Dubrow at Fig. 3, 2:58–64; *id.*, 10:2–9; *id.*, 10:12–29.

30. Accordingly, a person of skill in the art would have been able to understand the scope of the term “reservoir” with reasonable certainty in light of the specification and the prior art cited therein. I therefore disagree with NanoCollect’s assertions that the “reservoir” phrases in the ’295 Patent are indefinite and that they “fail[] to disclose a sufficiently definite structure.”

B. “Reservoir” in the ’797 Patent (claims 1 and 18)

31. The term “reservoir” is also used in claims 1 and 18 of the ’797 Patent. Both the ’797 Patent and the ’295 Patent issued from continuation applications from a common parent application, and thus their specifications (text and Figures) are identical or nearly so, with only minor differences in the claims. *See, e.g.*, ’797 Patent, Fig. 17A, 12:23–47. “Reservoir” is used in the same manner in both patents’ claims. For those reasons, a person of skill would have understood the term “reservoir” to have the same meaning as in the ’295 Patent. For example, claim 1 recites “dampening or absorbing the pressure pulse using a first reservoir in fluid

communication with the microfluidic flow channel,” which is very similar to the language employed for the first reservoir in the ’295 Patent claims.

32. Accordingly, the claims and phrases that use the term “reservoir” in the ’797 Patent are not indefinite for the same reasons described for the ’295 Patent.

C. “Reservoir” in the ’263 Patent (claims 1, 5, 15, and 16)

33. The term “reservoir” is also used in claims 1, 5, 15, and 16 of the ’263 Patent. The ’263 Patent shares a common ultimate parent application with the ’295 and ’797 Patents, and the named inventors are the same. Much of the text and Figures of the ’263 Patent are common to the ’295 and ’797 Patents. Figure 2 of the ’263 Patent, for example, is identical to Figure 17A of the ’295 and ’797 Patents (illustrated in annotated form above), save for element renumbering. And while there are minor differences in the claims, the term “reservoir” is used in the same sense in all claims. For example, claim 5 recites “a reservoir operatively associated with the switching device and adapted for originating the transient pressure pulse,” which is very similar to the language employed for the second reservoir in the ’295 Patent claims.

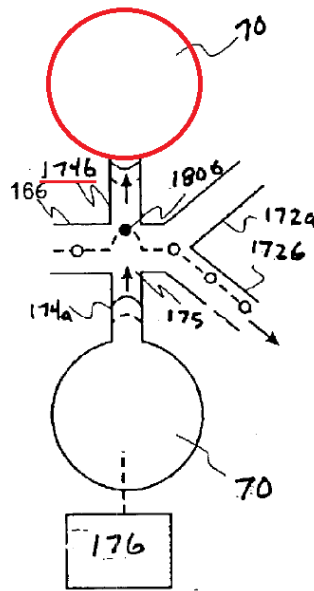
34. In summary, after reviewing the claims and specification of the ’263 Patent, I found that a person of skill would have understood the term “reservoir” to have the same meaning as in the ’295 and ’797 Patents. Accordingly, the claims and phrases that use the term “reservoir” in the ’263 Patent are not indefinite for the same reasons described for the ’295 and ’797 Patents.

VI. “Buffer”

A. “Buffer” in the ’528 Patent (claims 18, 22, and 24)

35. The context of the claims in light of the specification makes clear that the term “buffer” in the ’528 Patent claims refers to a physical structure that contains fluid and receives a pressure pulse. Claims 18 and 22 both refer to a “buffer” as a structure “for absorbing the pressure pulse” (and claim 24 includes a “buffer” through its dependency on claim 22). Claim 22 further

specifies that the “buffer” is “in communication with the second side channel.” A person of skill would understand the top “reservoir” in Figure 17A as an example of the claimed buffer (component 70, annotated in red) because it receives the pressure pulse to be absorbed (as indicated by the arrow) and is connected to a “side channel” 174b:

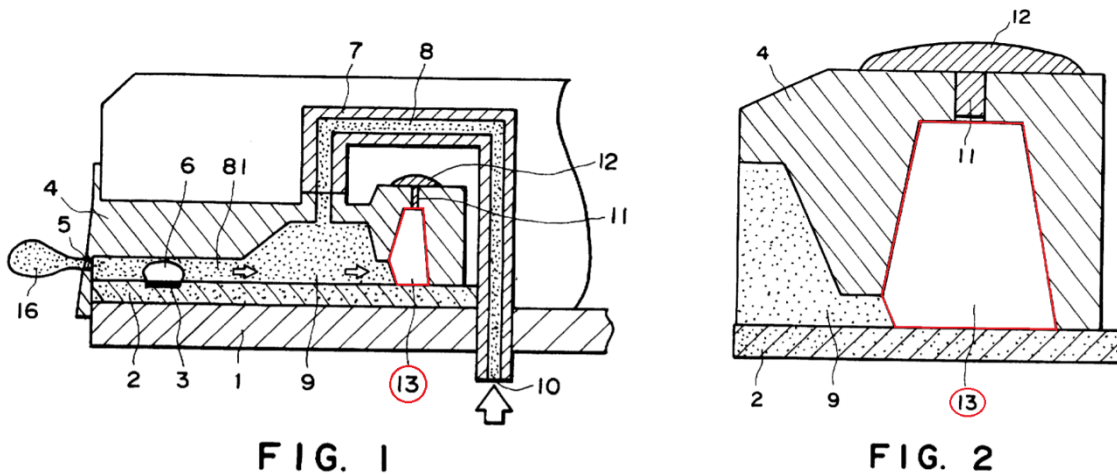


36. The '528 Patent's description of Figures 16–17C confirms this understanding. The patent describes two “bubble valves” that work in tandem to sort particles using the reservoir/buffer depicted in the figures. According to the specification, the “second side passage 174b and the second bubble valve [106] absorb the transient pressure variations in the measurement duct 166 induced via the actuator 176” due to the resilient properties of “reservoir 70b.” *Id.* at 12:27–34. In other words, the “buffer” is the same as the “first reservoir” claimed in the '295 Patent above. A person of skill would understand that the reservoir that receives the pressure pulse in the '528 Patent is an example of a “buffer.”

37. I understand from counsel for Cytonome that NanoCollect contends that claims 18, 22, and 24 of the '528 Patent are indefinite because “the term is not used, let alone defined, anywhere in the specification of the '528 patent” and thus “the POSA would not understand its

metes and bounds.” For the reasons above, the specification provides sufficient guidance to inform a person of skill with reasonably certainty the “metes and bounds” of the term “buffer.”

38. Furthermore, the term “buffer” had a commonly understood meaning in the field of microfluidics in 2002 consistent with the above understanding. For example, U.S. Patent No. 5,777,649 to Otsuka (“Otsuka”)—cited on the face of the ’528 Patent—is generally directed to an “ink jet printing head” and refers to a “buffer chamber” or “buffering chamber” that is a chamber structure used “for retaining air to absorb vibration of the ink” depicted as component 13 in Figures 1 and 2:



Otsuka at 6:24–39, Figs. 1 and 2 (annotated). A person of skill would have understood these openings—when configured to receive vibrations or pressure variations—as a typical example of a “buffer.”

39. Additionally, the term “buffer” has a plain an ordinary meaning, i.e., “something that absorbs or mitigates variations,” which underlies its use in a variety of contexts. For example, in chemistry, “buffer” is generally used to mean “a solution that mitigates pH variations.” In electronics, a “buffer” can be used to mean “a component that prevents variations in load impedance to affect upstream portions of a circuit.” And in mechanical engineering, a “buffer” is

commonly used to mean a “structure that absorbs vibrations.” The usage of “buffer” in the context of the Asserted Patents is just another example of this plain and ordinary meaning of the word.

40. I understand from counsel for Cytonome that NanoCollect contends that the term “buffer” is indefinite because “[t]here is no commonly understood structure associated with the term ‘buffer,’ it does not have a plain and ordinary meaning as used, and was not commonly used in the field of microfluidics to describe components that receive pressure pulses at the time of the invention.” As shown by usage in a variety of fields, “buffer” does have a plain and ordinary meaning as used; and as shown by the prior art, the term “buffer” had a well-understood meaning in the field, and persons of skill understood “buffers” to refer to components that receive pressure pulses at the time of the invention.

41. For all of these reasons, I disagree with NanoCollect’s assertion that the “buffer” phrases in the ’528 Patent are indefinite. A person of skill in the art would have been able to understand the scope of the term “buffer” with reasonable certainty in light of the specification and the prior art cited therein.

B. “Buffer” in the ’850 Patent (claims 1 and 11)

42. The term “buffer” is also used in claims 1 and 11 of the ’850 Patent. The ’850 Patent issued from a continuation-in-part of a parent application of the ’528 Patent, and thus their specifications (text and Figures) and claims are very similar. “Buffer” is used in the same manner in both patents’ claims. For those reasons, a person of skill would have understood the term “buffer” to have the same meaning as in the ’528 Patent. For example, claim 1 of the ’850 Patent recites “a buffer configured to fluidically co-operate with the actuator for absorbing or dampening the pressure pulse,” which is very similar to the language employed for the buffer in the ’528 Patent claims. Furthermore, the ’850 Patent uses many of the same figures as the ’528 Patent, as well as nearly identical descriptions of those figures. *See, e.g.,* ’850 Patent, Figs. 2–4, 8:22–9:7.

Accordingly, the claims and phrases that use the term “buffer” in the ’850 Patent are not indefinite for the same reasons described for the ’295 Patent.

43. Moreover, the ’850 Patent provides additional, specific examples of “buffers.” For example, the specification explains that “[t]he second bubble valve 100a serves as a buffer for absorbing the pressure pulse created by the first bubble valve 100b.” *Id.* at 6:24–26. It also describes a “second side passage 24a, positioned opposite of the first side passage 24b is hydraulically connected to a buffer chamber 70a in the second bubble valve 100a for absorbing pressure transients.” *Id.* at 6:31–35; *see also* 7:31–33. All of these examples would confirm to a person of skill that a buffer has a definite structure in the Asserted Patents, namely a physical structure for receiving a pressure pulse.

VII. “Chamber”

A. “Chamber” in the ’283 Patent

44. The term “chamber” is used in claims 1, 5, and 6 of the ’283 Patent. Based on my review of the claims and specification, I conclude that a person of skill would have understood the term “chamber” to have the same meaning as “reservoir,” namely a physical structure that contains fluid.

45. For example, claim 1 of the ’283 Patent recites a “first chamber in fluid communication with the duct via a first side opening” and “an actuator provided on the substrate and associated with the first chamber, the actuator configured to increase a pressure within the first chamber and to discharge an amount of fluid from the first side opening into the duct.” This language closely tracks the “reservoir” phrases recited above for the ’295, ’797, and ’263 Patents. For instance, claim 1 of the ’295 recites a “second reservoir operatively associated with the flow channel and adapted for generating the pressure pulse based on a change in volume or pressure in the second reservoir, and dependent claim 2 further specifies “an actuator or pressurizer

operatively associated with the second reservoir and adapted for generating the pressure pulse by varying the volume or pressure in the second reservoir.”

46. In other words, “chamber” in the ’283 Patent and “reservoir” in the ’295 Patent both describe a component, connected to a “duct” (a.k.a., a “flow channel”), in which component pressure is varied by an actuator to generate a pressure pulse. In fact, the ’295 Patent specification explicitly uses the term “chamber” to describe a “reservoir.” *See, e.g.*, ’295 Patent at 12:18–20 (“Basically, the reservoir 70b of the second bubble valve 10b is a chamber . . .”). And the ’283 Patent uses the term “chamber” to describe the “buffer” and “actuator” reservoirs (70a and 70b) shown in the figures that are common to all Asserted Patents. *See, e.g.*, ’283 Patent at 9:30–34 (“More particularly, the actuator chamber 70b and the buffer chamber 70a may be placed such that the flow resistance between them is less than the flow resistance between a selected particle and a subsequent particle in the stream of particles.”); Figs. 1–4.

47. Accordingly, a person of skill would have understood the term “chamber” in the ’850 Patent claims to have the same meaning as “reservoir” in the ’295, ’797, and ’263 Patents.

B. “Chamber” in the ’850 Patent

48. The term “chamber” is also used in claims 10 and 11 of the ’850 Patent. Both the ’850 Patent and the ’283 Patent issued from continuation applications from a common parent application, and thus their specifications (text and Figures) are identical or nearly so, with only minor differences in the claims. *See, e.g.*, ’850 Patent, Figs. 1–4, 8:22–48. “Chamber” is used in the same manner in both patents’ claims. For those reasons, a person of skill would have understood the term “chamber” to have the same meaning as in the ’283 Patent. For example, the ’850 Patent uses the same language as the ’283 Patent to describe the “buffer chamber 70a” and the “compression” or “actuator chamber 70b” in the figures. ’850 Patent at Figs. 1–4, 6:27–40, 7:31–33, 9:18–22.

49. Accordingly, a person of skill would have understood the term “chamber” in the ’850 Patent claims to have the same meaning as “reservoir” in the ’295, ’797, and ’263 Patents.

VIII. “Absorbing”

50. The term “absorbing” (and variants, such as “absorbs”) is used in the ’528 Patent, claims 18 and 22; ’295 Patent, claims 1 and 9; ’797 Patents, claims 1 and 18; ’850 Patent, claim 1; and ’263 Patent, claims 1 and 15. After reviewing the claims and specifications, I disagree with NanoCollect’s contention that “absorbing” means “to receive without recoil or echo.” Notably, I do agree with NanoCollect’s construction to the extent that the reservoirs/chambers/buffers used for “absorbing” must “receive” the pressure pulse/wave/variation. That is because the term “absorbing” has a well understood meaning, which is simply to “take up” or “take in.” And I also generally agree that “a POSA would understand that absorption of a pressure pulse prevents disturbance to the flow of the non-selected particles in the stream of particles.” The specification supports that. *See, e.g.*, ’850 Patent at 9:48–56. But that language does not prohibit all recoil or echo of the pressure wave in the device.

51. A person of skill would not understand the term “absorbing” to preclude any and all rebound or echo. This is because, as a practical matter, microfluidic devices cannot be manufactured to be perfectly, or ideally, resilient such that absolutely no echo occurs when a pressure pulse is taken into a buffer or the like. In terms of a “buffer” or “reservoir” for absorbing a pressure pulse, some rebound or echo will almost always exist due to common design constraints (such as the size of the buffer, a common constraint in microfluidics; and the properties of the materials used in manufacturing as well as in operation of the device). A person of skill would readily understand this.

52. At the same time, a person of skill would understand that “absorption” is nonetheless required, and therefore will design the buffer with the proper resiliency for achieving

the absorption needed for the application at hand. Two examples for providing such resiliency are to use a “flexible membrane” in a liquid-filled reservoir or to partially fill the reservoir with a compressible gas instead of a liquid (or with a more compressible liquid). *See, e.g.*, ’263 Patent at 9:26–29; ’528 Patent at 11:8–14; ’850 Patent at 9:51–56. This resiliency may be controlled so as to reduce echo/rebound, for example, by choosing membranes of appropriate flexibility or choosing a gas (or liquid) of appropriate compressibility.

53. The ’850 Patent describes this “resiliency” as a “spring constant,” which is a common and well-known physical characteristic that indicates the “stiffness” of a device and (more specifically in this context) would indicate the “absorption” capacity of the buffer. The ’850 Patent explains that “[t]he spring constant of the buffer 100b *may be varied according to the particular requirements* by varying the volume of the buffer chamber 70b, the cross-sectional area of the side passage 24b and/or the stiffness or the thickness of a flexible membrane (reference 72 in FIG. 7) forming the buffer chamber 70b.” ’850 Patent at 9:51–56 (emphasis added). In other words, the patentees contemplated different levels of “absorption” for different applications. Persons of skill would understand that the characteristics for varying the spring constant (such as the volume of the buffer) are to be selected by the designer, who will be familiar with the tolerable amount of echo/rebound for his or her particular application.

54. In sum, depending on whether his or her “particular requirements” necessitate absorbing more or less of the pressure wave, a person of skill could configure the buffer to meet that need. And although this particular statement regarding the “spring constant” of the buffer does not appear in the other patents at issue here, the concepts of buffer design—including “spring constant”—were well known to a person of skill.

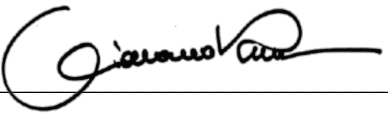
55. To use an analogy, this concept is somewhat similar the shock absorber on a car. The road shock is taken up, but some of that shock is inevitably returned when the shock absorber rebounds. How much or little rebound depends on selected design criteria of the shock absorber (such as pressure, volume, etc.), which need only ensure that the objectives for that particular car are achieved. Likewise, in the Asserted Patents, the echo or rebound of some of the pressure pulse/wave is tolerable so long as it doesn't defeat the sorting operation, i.e., knock the non-selected particles out of their intended flow path for sorting, as stated in the '850 Patent at 9:48–51.

IX. “Dampen”

56. The term “dampen” (and variants, such as “dampening”) is used in many asserted claims, including '295 Patent, claims 1, 9; '797 Patent, claims 1 and 18; '850 Patent, claim 1; '263 Patent, claims 1 and 15. After reviewing the claims and specifications, I do not find unreasonable NanoCollect's proposal to construe “dampen” as “to meaningfully dissipate.”

57. I do not agree, however, with some of NanoCollect's statements in its Responsive Brief regarding the application of this construction. In particular, I disagree that “upon being meaningfully dissipated, a pressure pulse would not reflect off of the absorbent.” Similar to its incorrect interpretation of “absorbing,” this would require eliminating *any* “recoil or echo.” The Asserted Patents do not require this degree of “dampening” for the same reasons it does not require this degree of “absorption.” The Asserted Patents only require that dampening, like absorption, be such so as to “prevent[] a pressure wave ... from ... affecting the flow of the remaining particles in the stream of particles.” *See, e.g.*, '263, 11:20–25.

I declare, under penalty of perjury, under the laws of the United States, that the foregoing is true and correct and that this Declaration was completed this 31st day of January, 2020.



Giacomo Vacca, Ph.D.